US006945821B2

(12) **United States Patent**
Stoner et al.

(10) **Patent No.: US 6,945,821 B2**
(45) **Date of Patent: Sep. 20, 2005**

(54) **CONNECTOR**

(75) Inventors: **Mark Peter Stoner**, Dassel, MN (US); **John Joseph Heinsch**, Watertown, MN (US); **David Leland Osterkamp**, Dassel, MN (US)

(73) Assignee: **Crest Health Care**, Sauk Rapids, MN (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/413,891**

(22) Filed: **Apr. 14, 2003**

(65) **Prior Publication Data**

US 2003/0194910 A1 Oct. 16, 2003

Related U.S. Application Data

(60) Provisional application No. 60/372,898, filed on Apr. 15, 2002.

(51) **Int. Cl.**[7] **H01R 33/90**
(52) **U.S. Cl.** **439/638**; 439/639
(58) **Field of Search** 439/638, 639, 439/650, 654, 502, 506; 340/825.19

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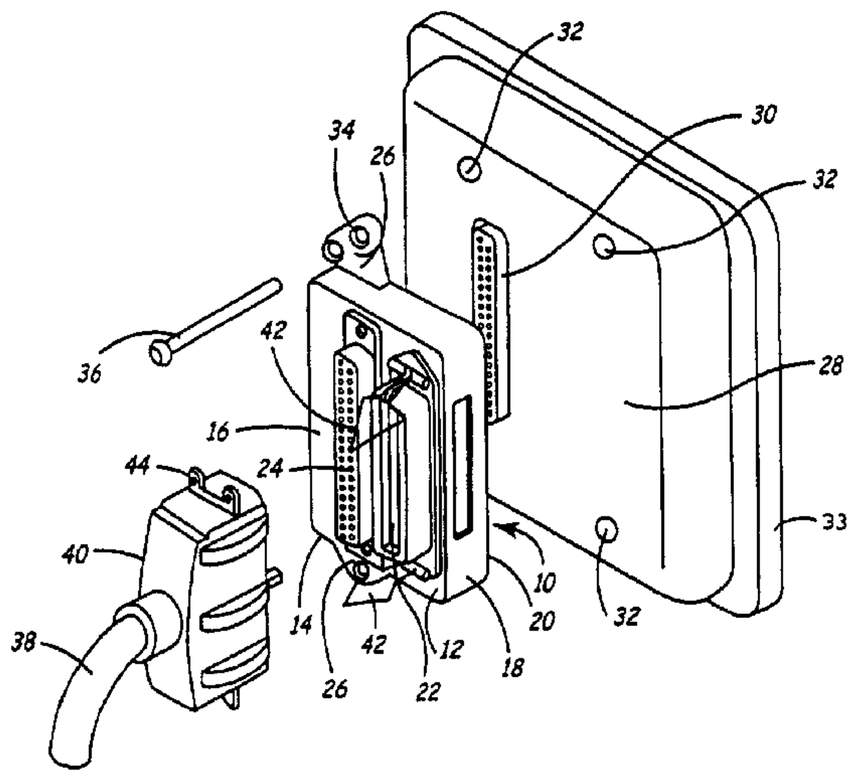
Primary Examiner—Briggitte R. Hammond
(74) *Attorney, Agent, or Firm*—Dorsey & Whitney LLP

(57) **ABSTRACT**

The present invention relates to an adapter, wherein the adapter has a housing with a rear face, a front face, an outside perimeter face. A first connector is located on the rear face. A second connector and a third connector are located on the front face. A mounting piece is located on the outside perimeter face. The first connector is designed to mate with a connector located on an interface unit coupled to a medical facility communication system. The second connector is designed to mate with a connector on a first end of a communications cable. The second end of the communications cable is connected to an interface, such as a hospital bed interface. The mounting piece has mounting holes that allow the adapter to be attached to the interface unit.

13 Claims, 12 Drawing Sheets



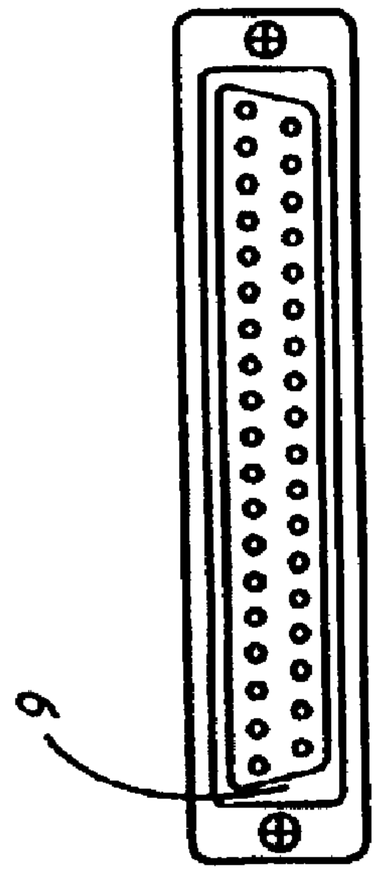


FIG. 1b
(Prior Art)

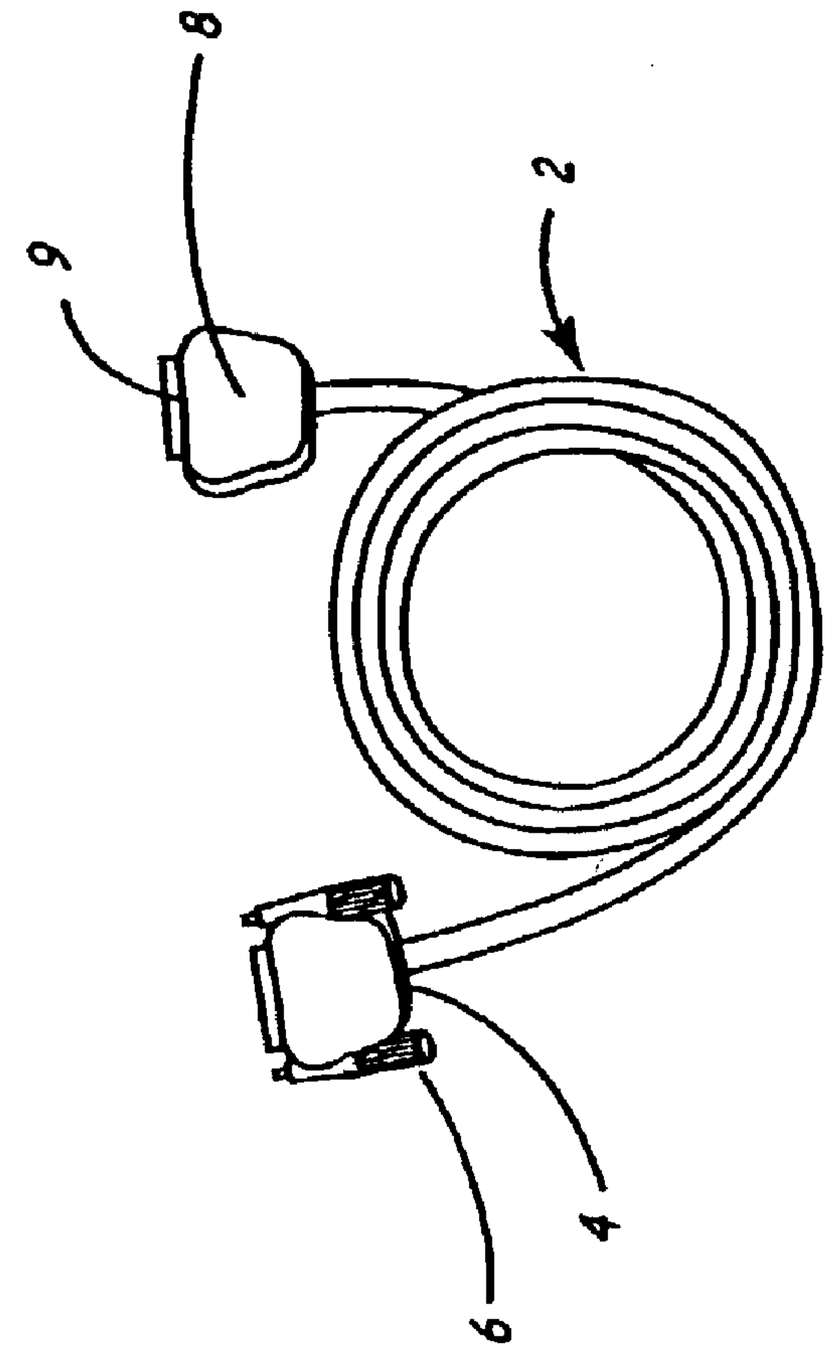


FIG. 1a
(Prior Art)

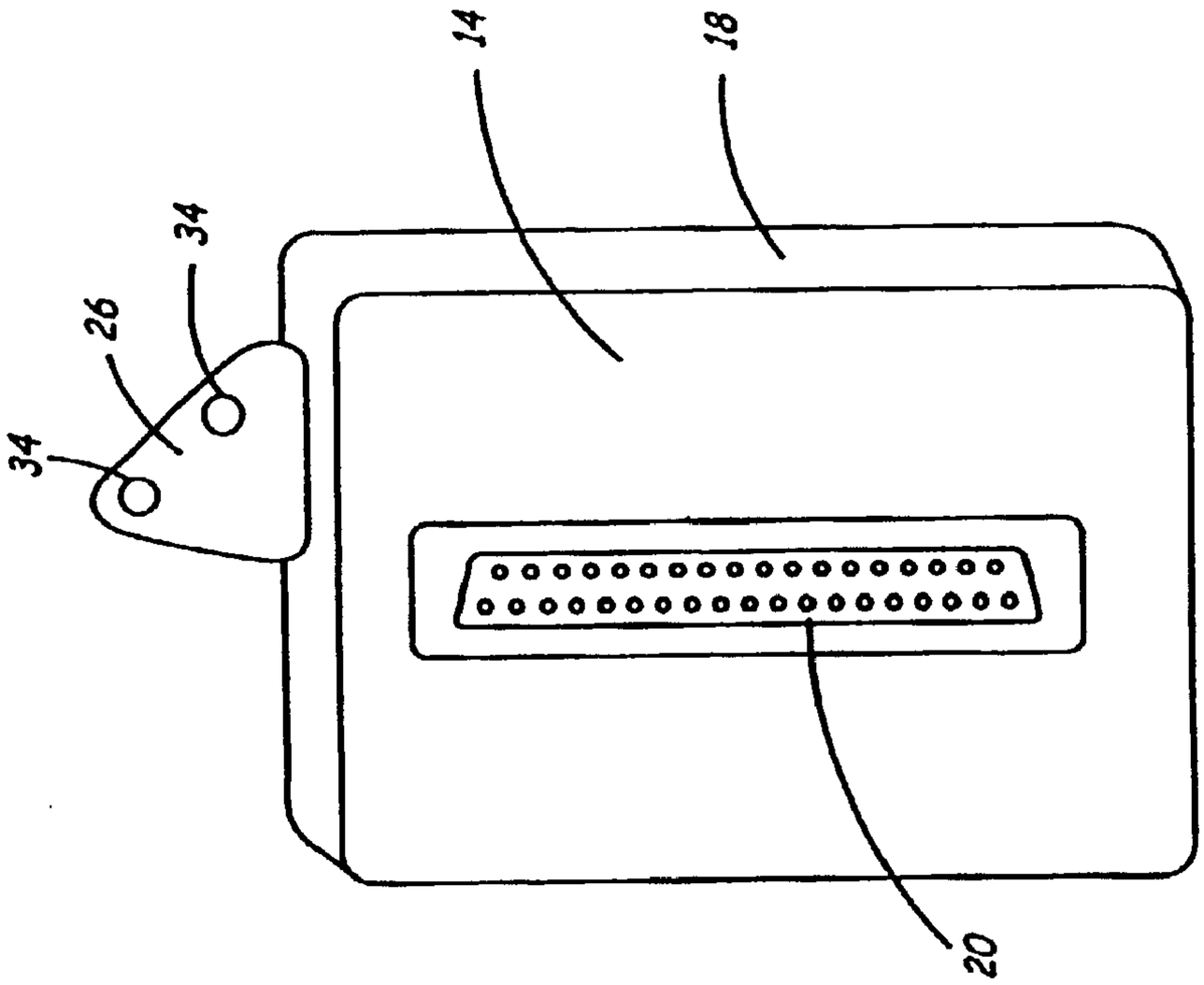


FIG. 3

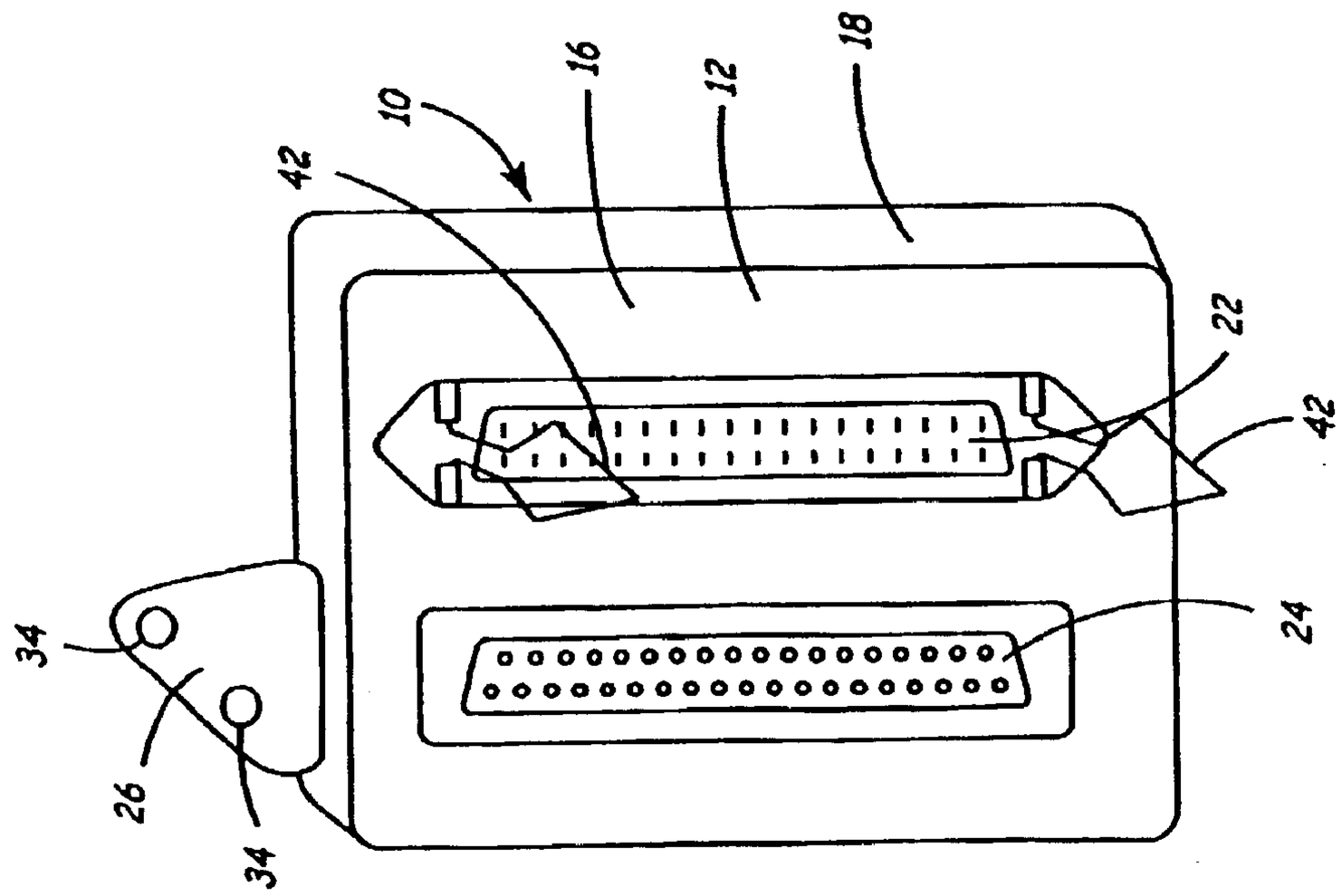


FIG. 2

FIG. 5

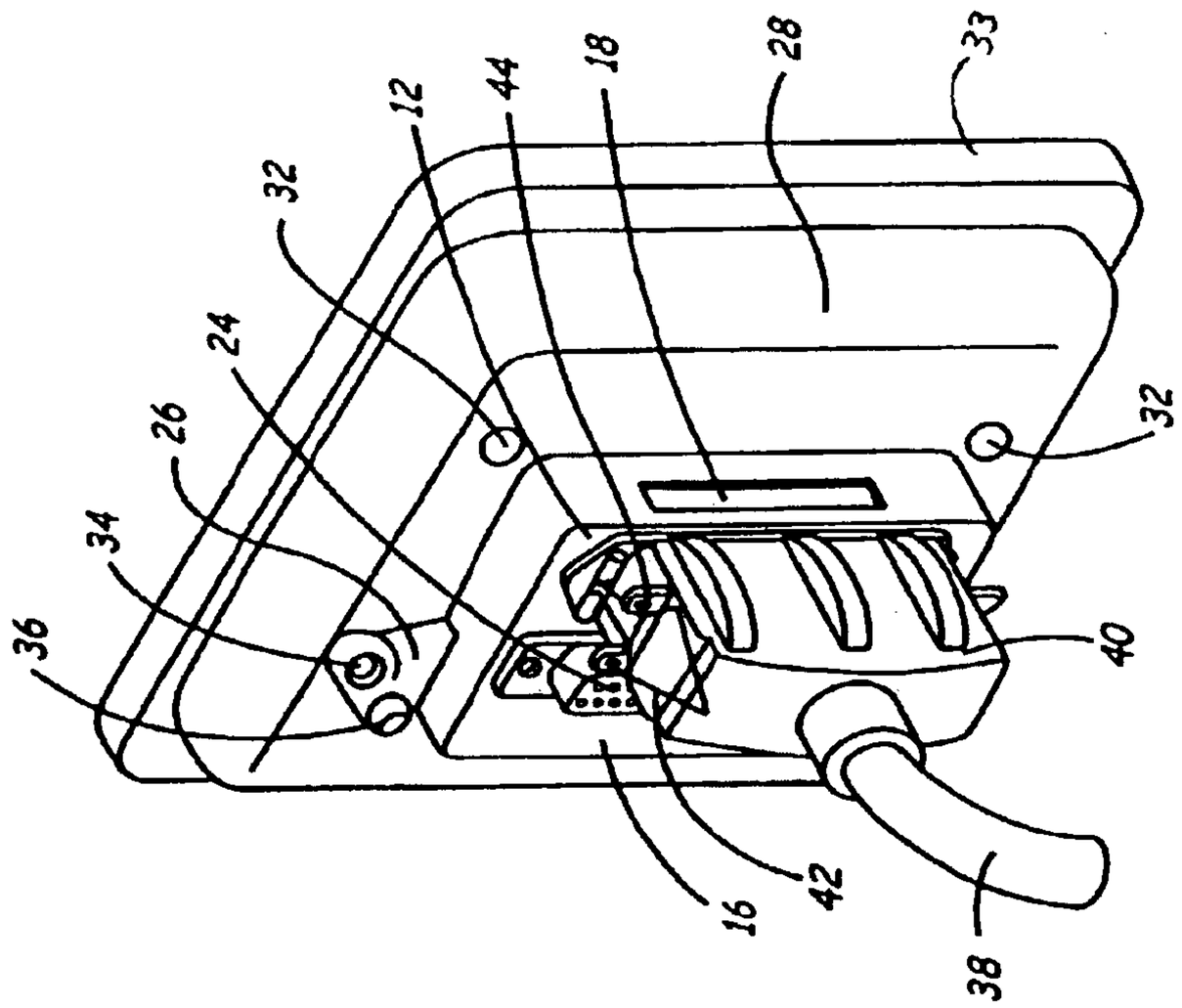
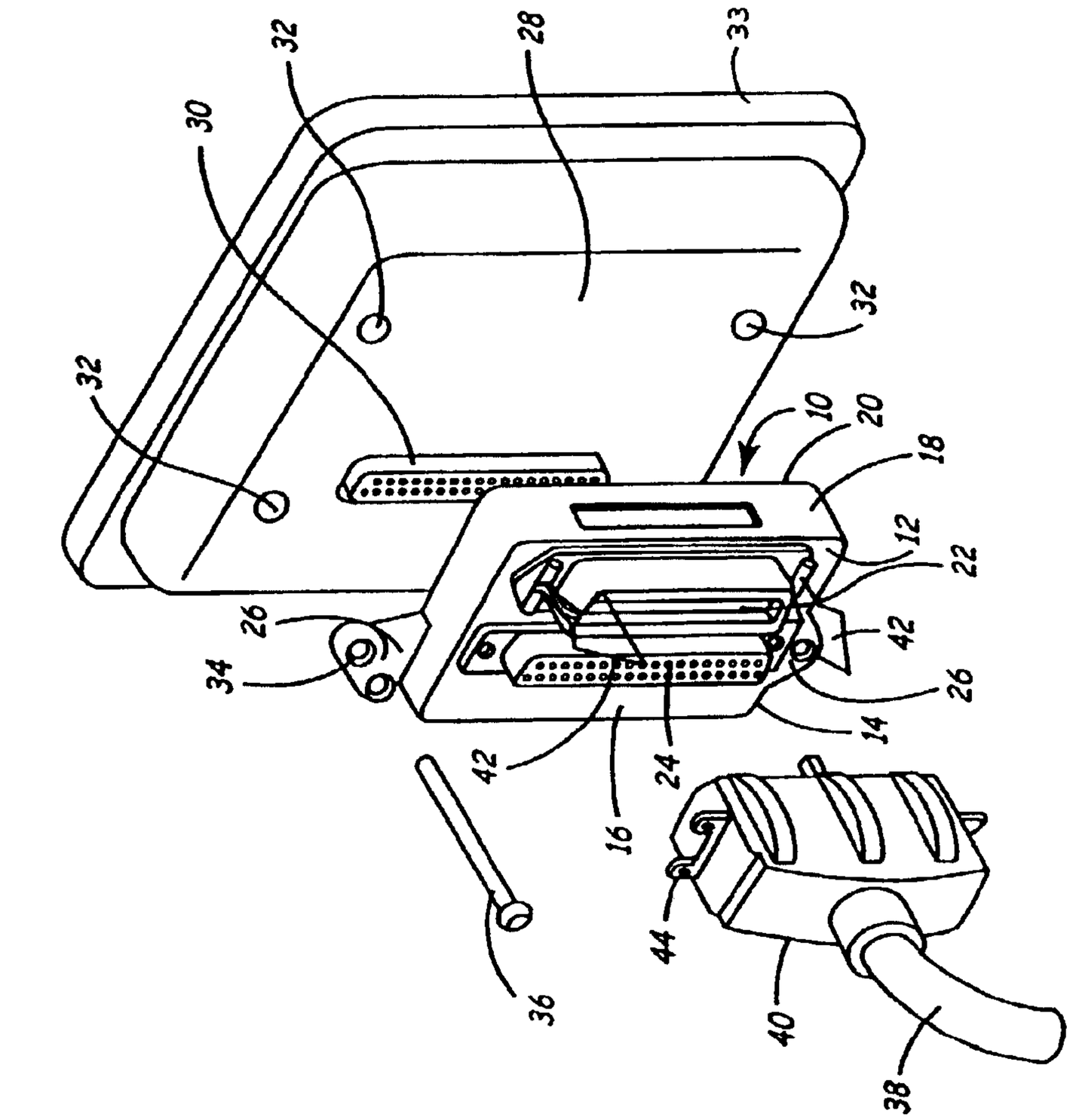

12
44
18
28
33
32
24
26
34
36
32
40
16
42
38

FIG. 4


30
32
28
33
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22
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16
44
36
40
38

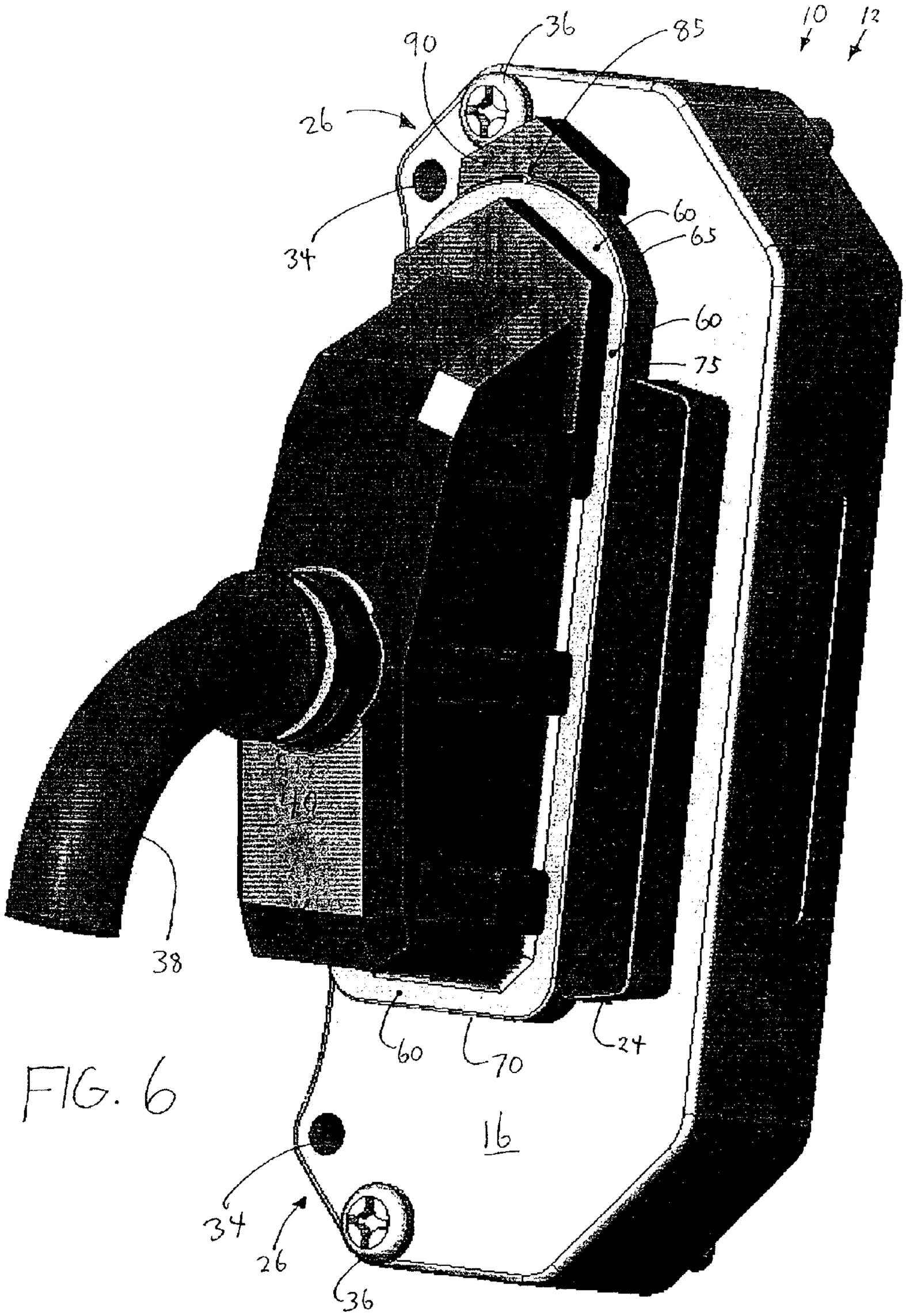


FIG. 6

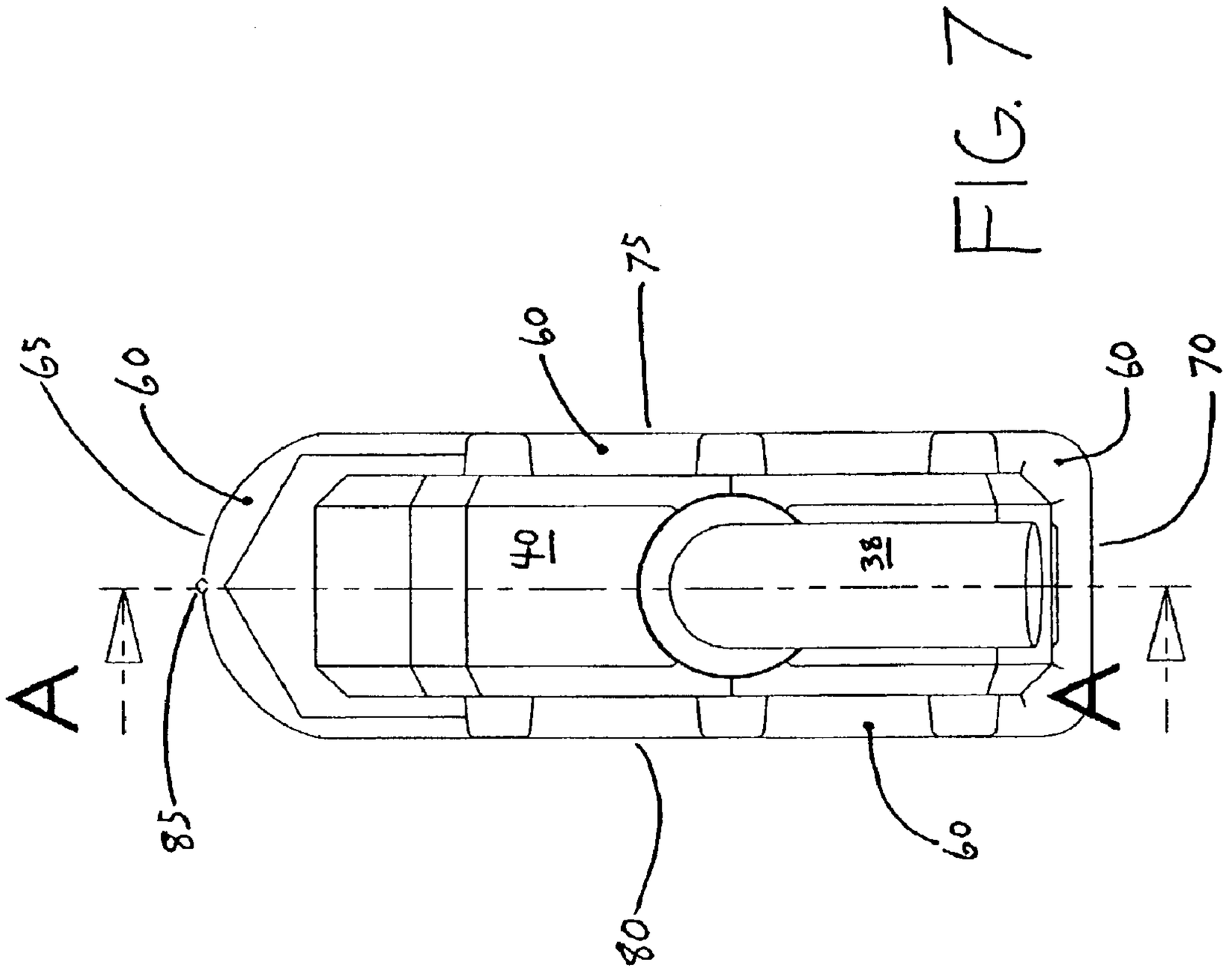


FIG.

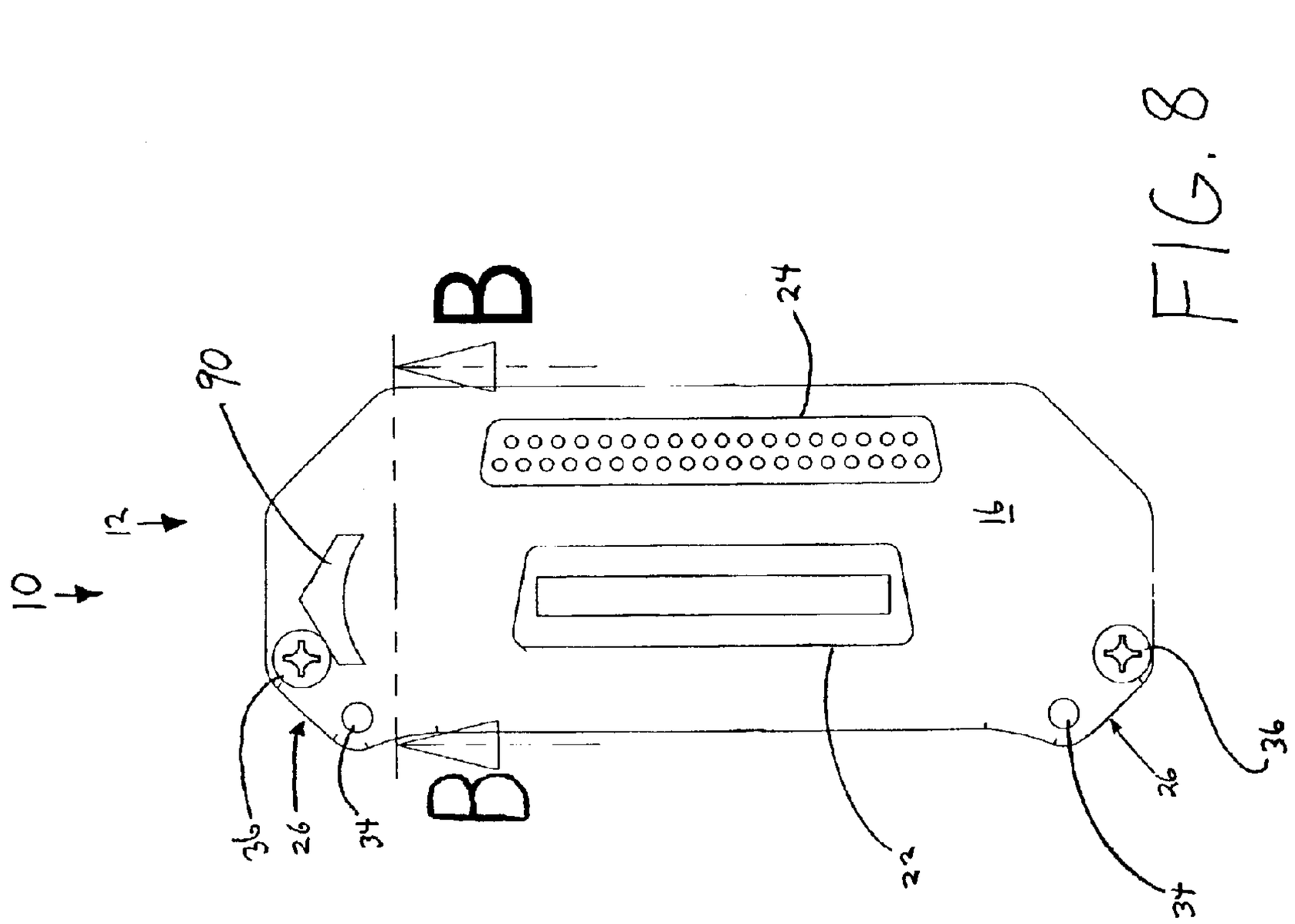


FIG. 8

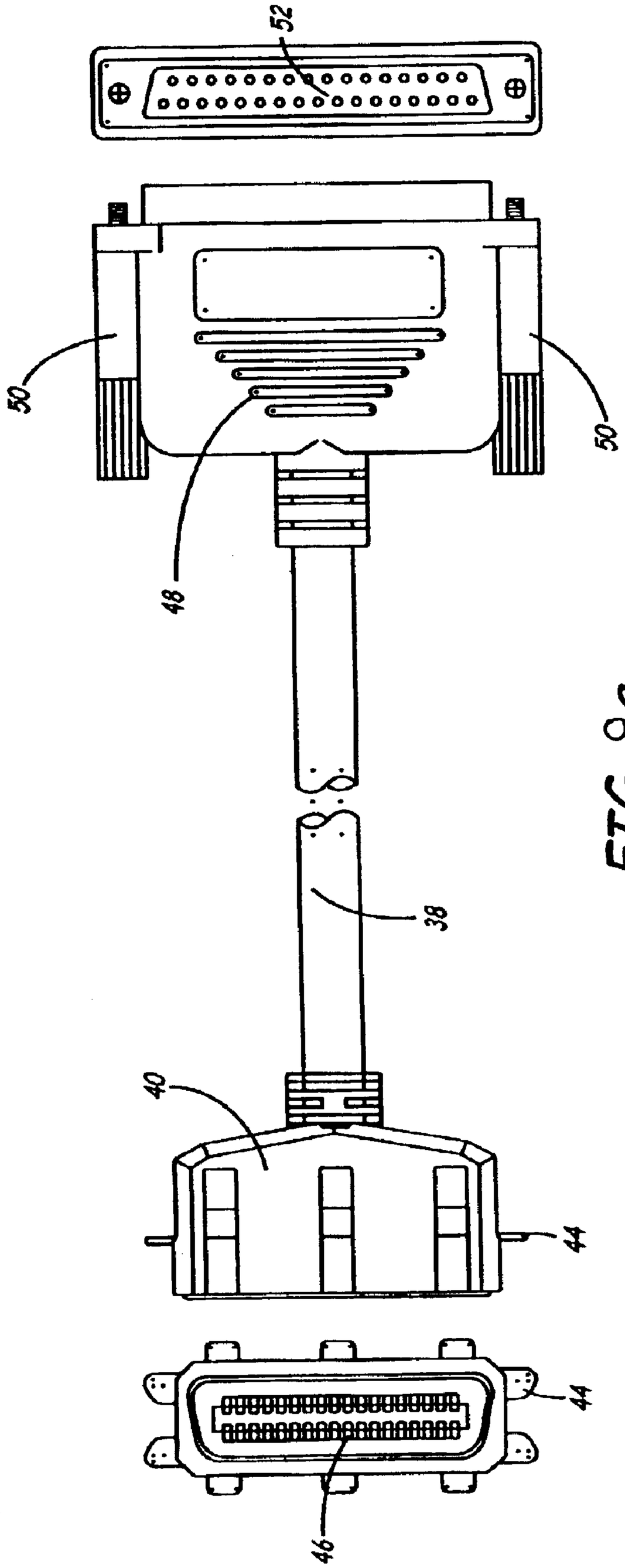


FIG. 9c

FIG. 9a

FIG. 9b

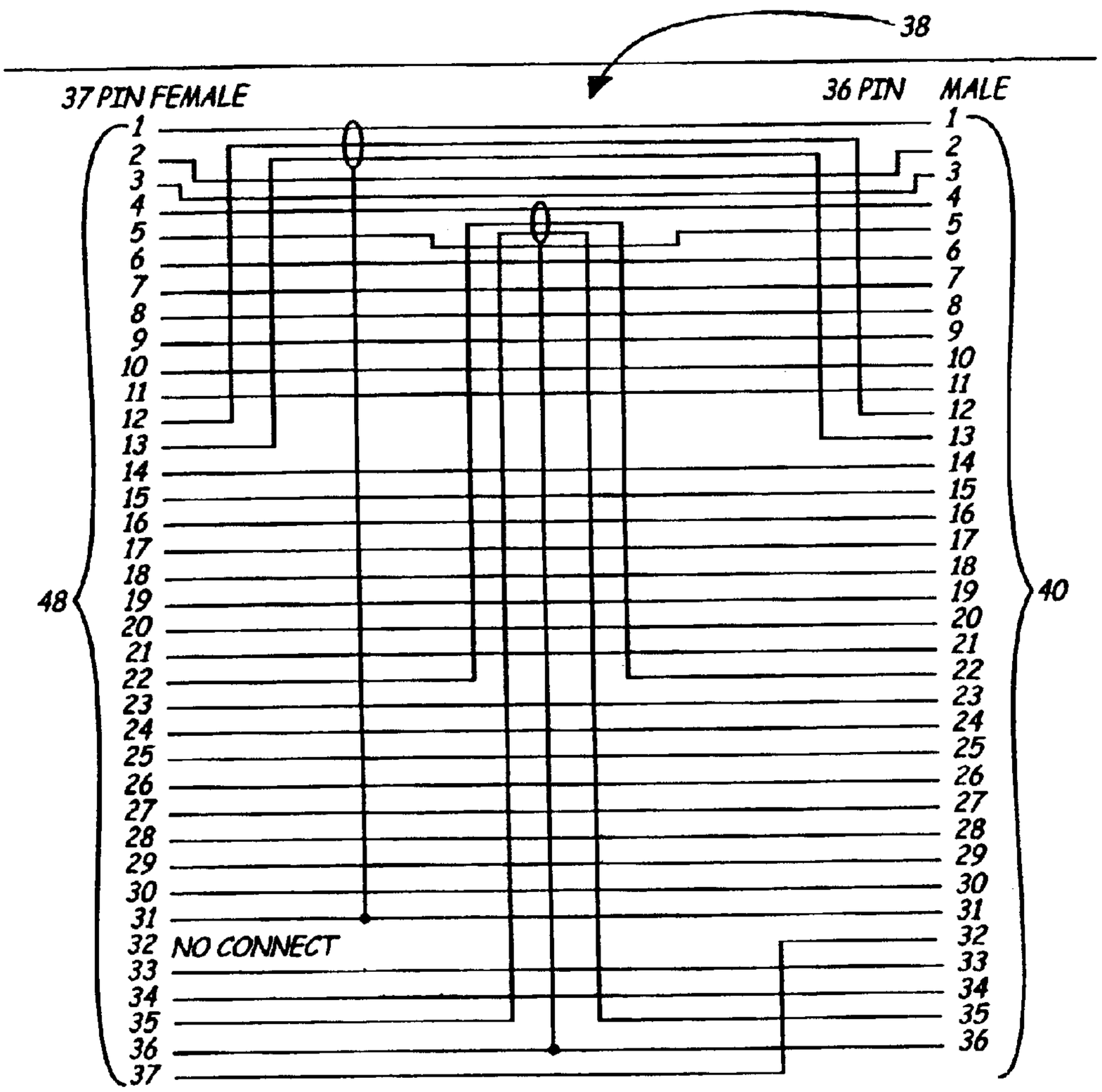

38
37 PIN FEMALE
36 PIN MALE
48
40
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
32 NO CONNECT
33 34 35 36 37
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36

FIG. 10

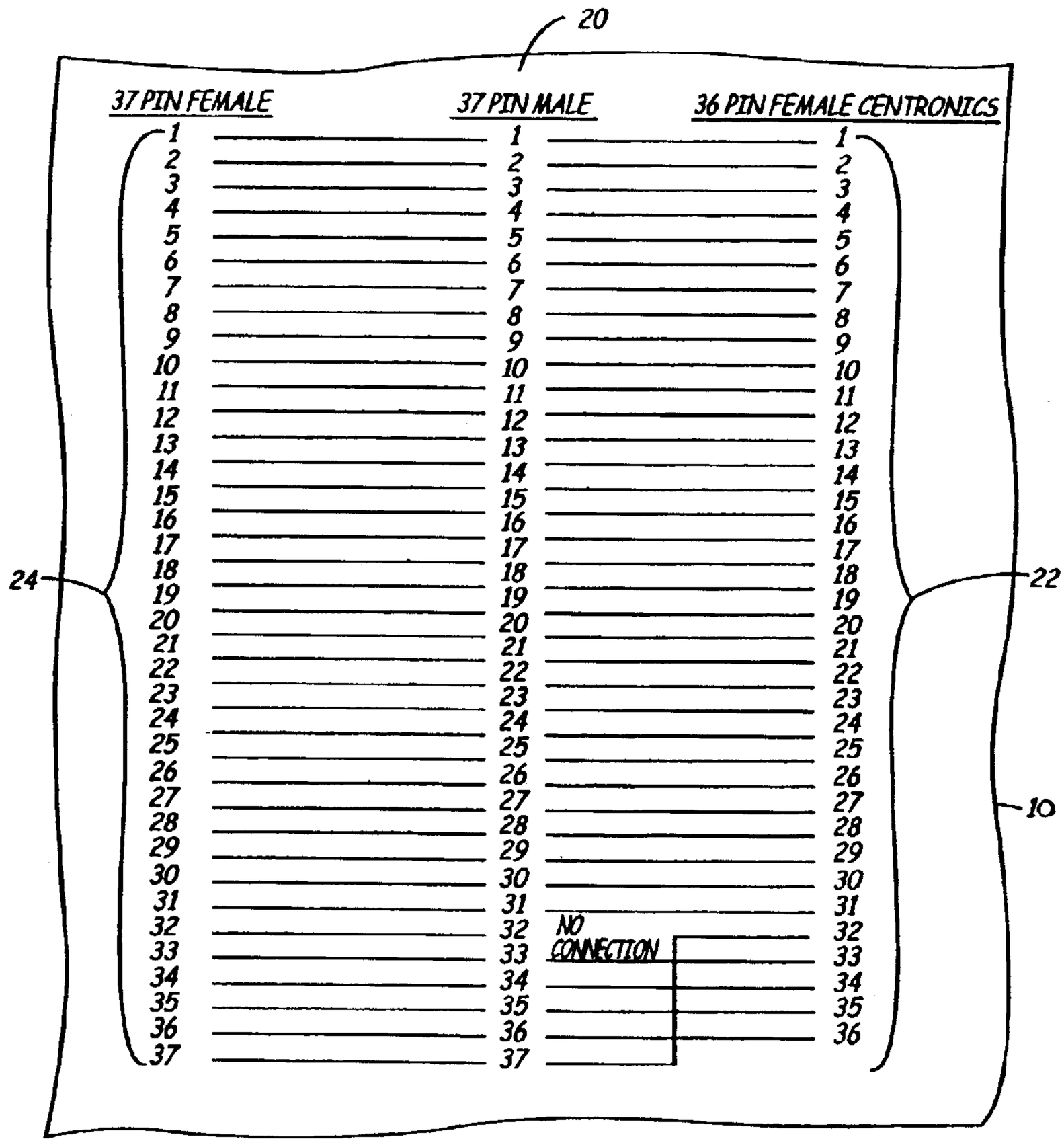

20
37 PIN FEMALE
37 PIN MALE
36 PIN FEMALE CENTRONICS
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
NO CONNECTION
24
22
10

FIG. 11

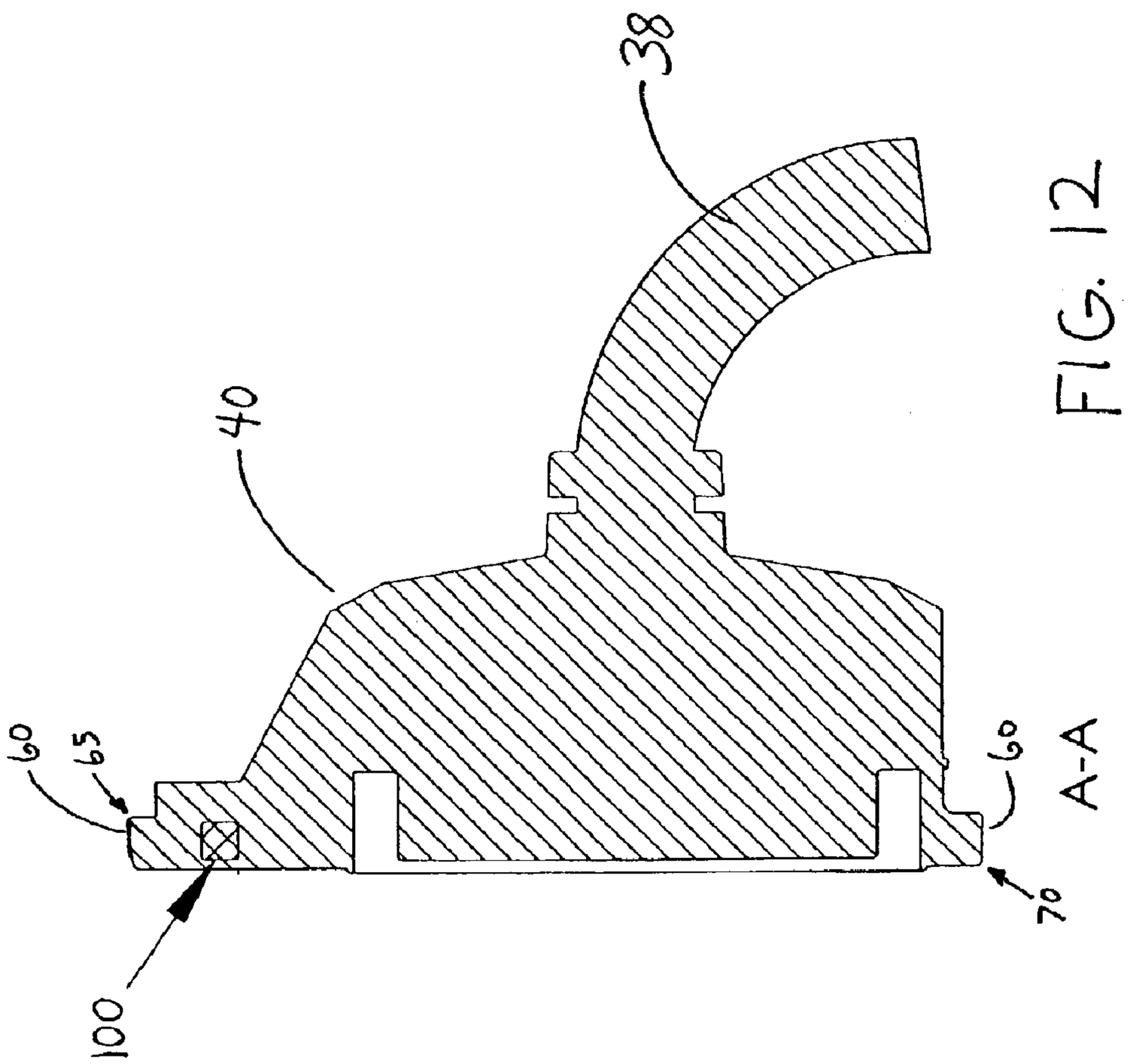
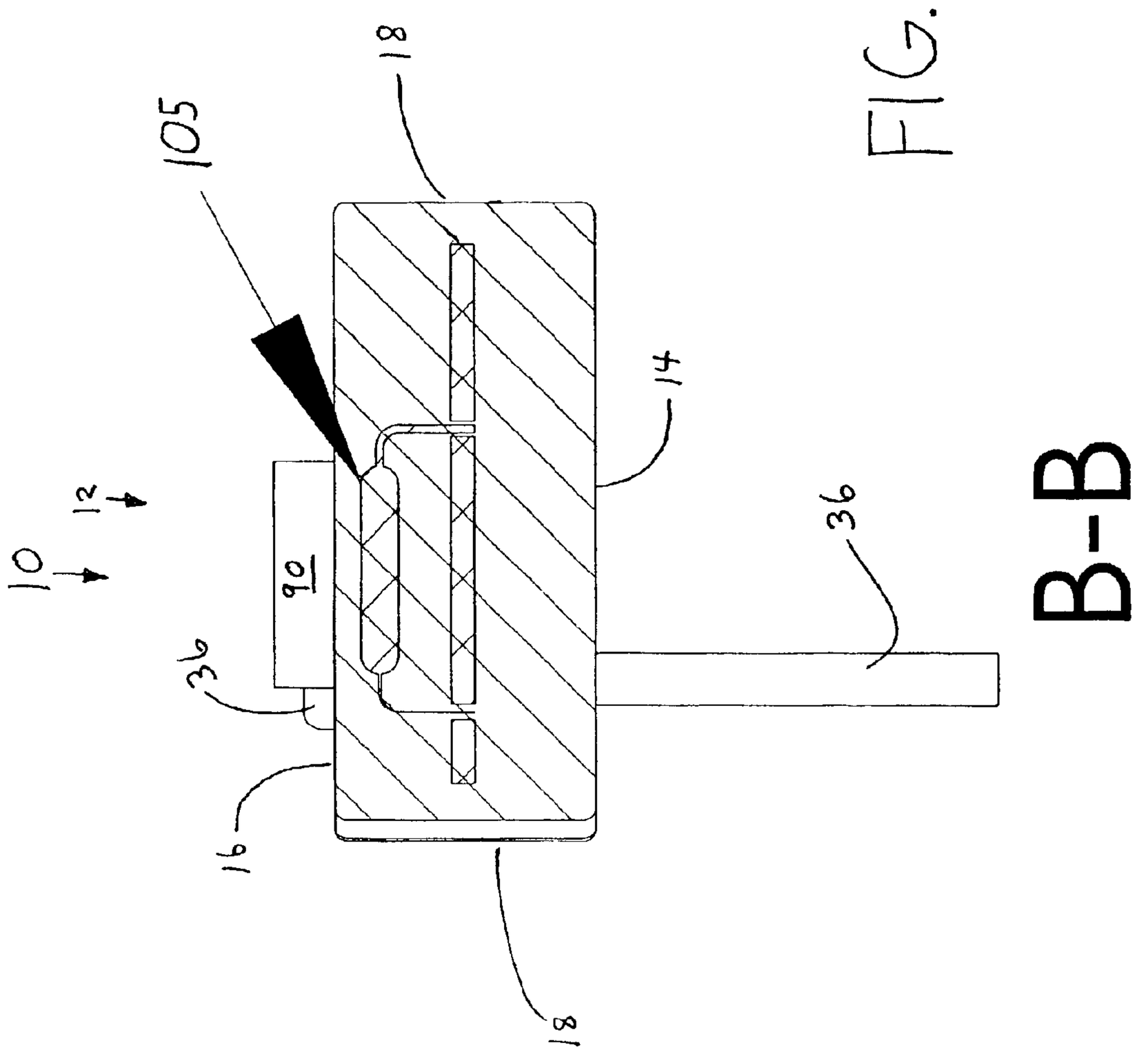


FIG. 12

FIG. 3



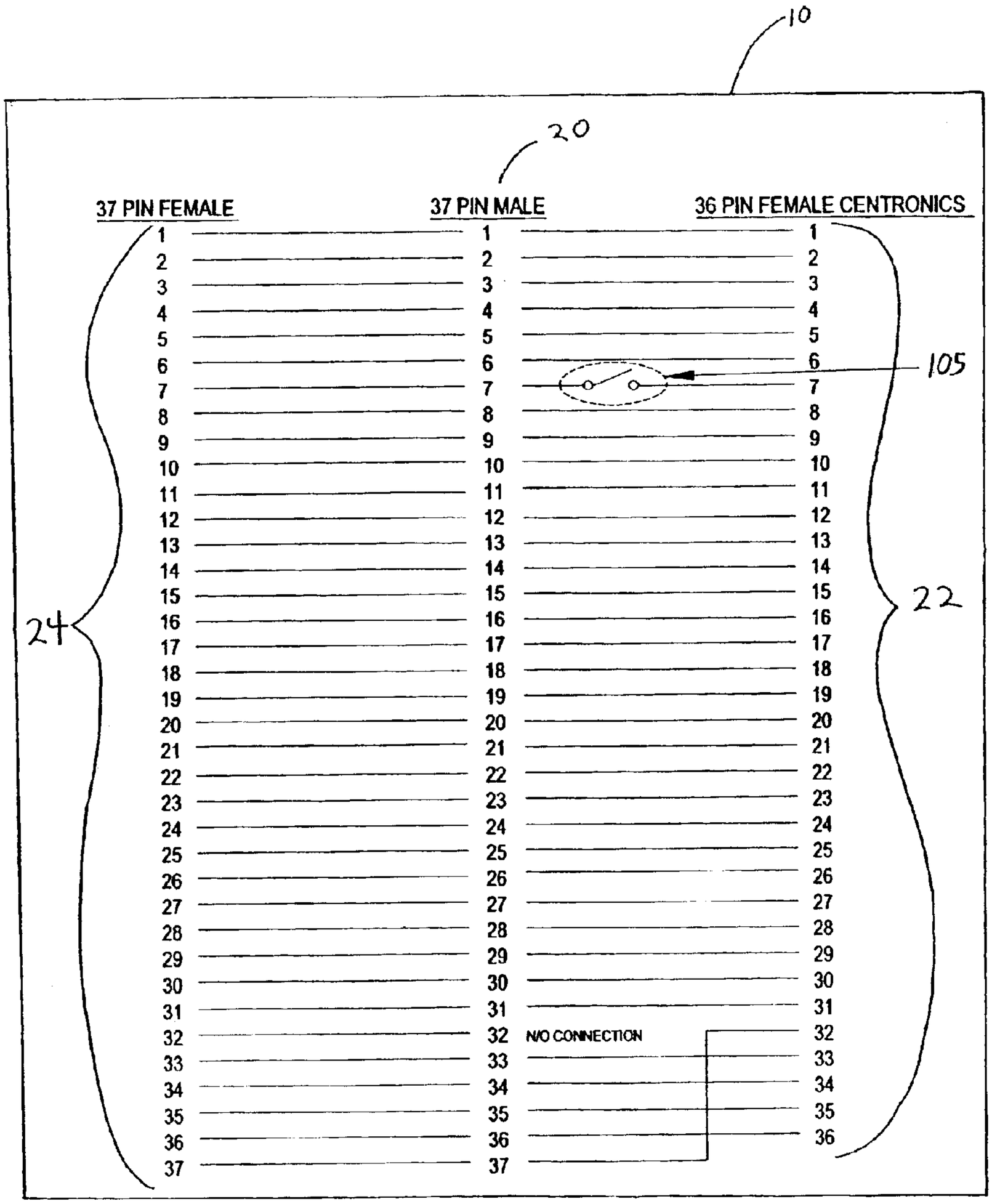

10
20
37 PIN FEMALE
37 PIN MALE
36 PIN FEMALE CENTRONICS
105
24
22
N/O CONNECTION

FIG. 14

CONNECTOR

RELATED APPLICATIONS

This application claims priority to U.S. Provisional App. Ser. No. 60/372,898, filed on Apr. 15, 2002, entitled "Connector."

BACKGROUND

The present invention, in one embodiment, relates to methods and apparatus for connecting cables, such as communication cables, to interface units. More specifically, the present invention, in one embodiment, relates to methods and apparatus for connecting a hospital bed communications cable connector to an interface unit connector.

It is common for hospital bed manufacturers to integrate into the side rail of their beds an interface for nurse call, bed, lighting, and entertainment control, as well as a speaker for television and nurse call intercom audio. A communications cable provides the connection for these control signals from the TV or nurse call system to the bed via an interface unit located on a wall or at a station. Hospital beds are often moved and sometimes this is done in haste without disconnecting the communications cable from the wall or the bed interface.

FIG. **1***a* shows a prior art communications cable **2** as described below. Current hospital bed interface units are typically designed to be attached to the communications cable **2** via a D-subminiature connector **4** with thumbscrews **6**, whereas the wall interfaces are typically designed to be connected to the other cable end **8** via a friction fit 37-pin D-subminiature male connector **9**, as shown in FIG. **1***b*, mating with a female connector. The 37-pin D-subminiature male connector **9**, which is typically located on the end of the cable **2**, is subject to frequent damage. Some of the ways in which the connector **9** can be damaged are from: moving the bed without first disconnecting the connector **9**, which results in the bending of one or more of the pins; trying to connect or reconnect the connector **9** incorrectly and bending individual pins; rolling the bed casters over the connector **9** when it is disconnected from the interface unit; or disconnecting the cable **2** by pulling with great force at sharp angles on the cable **2**. Such damage to the 37-pin D-subminiature connector **9** greatly reduces the useful life of communication cables **2**.

Various efforts have been made to minimize connector damage. One involves a retrofit kit that prevents inadvertent mismatching of the 37-pin connectors. Another effort involves providing a communication cable with a more robust male and female connector in the middle of the cable, wherein the cable is designed to disconnect in the middle rather than at the wall. Other efforts have been made to strengthen the design of the 37-pin connector. Each of these has proven to be inadequate in providing an optimally durable, yet easily used, convenient communication cable connection.

BRIEF SUMMARY

In one embodiment, the present invention is an adapter for connecting two connectors. The adapter has a housing having a front face, a rear face and an outside perimeter face. A first connector is located on the rear face. A second connector and a third connector are located on the front face. The three connectors are different and the adapter facilitates the connection of a communications cable to a wall interface unit.

The present invention, in another embodiment, is a communications system for communicating between a bed interface module of a hospital bed and a medical facility communication system, wherein the bed interface module has a first connector. The system comprises a wall interface module, a communication cable, and an adapter. The wall interface module is operably coupled to the medical facility communication system and includes a second connector. The communication cable comprises a first end and a second end. The first end includes a third connector and the second end includes a fourth connector that is compatible with the first connector. The adapter is configured to be interposed between the wall interface module and the first end of the communication cable. The adapter comprises a fifth connector that is compatible with the second connector and a sixth connector that is compatible with the third connector.

In another embodiment, the present invention is a method for connecting a communications cable to a wall interface unit in a hospital bed environment, wherein a cable has a first connector and the interface unit has a second connector, and wherein the first and second connectors are incompatible. The method comprises providing an adapter between the incompatible connectors, wherein the adapter comprises a housing having a front side and a backside, a third connector located on the front side and configured to be compatible with the first connector, and a fourth connector located on the back side and configured to be compatible with the second connector. The method also comprises connecting the first connector to the third connector and connecting the second connector to the fourth connector.

In another embodiment, the present invention is a communications cable for connecting between a bed interface module of a hospital bed and an adapter configured to connect to a wall interface module connected to a medical facility communication system. The bed interface module has a first connector and the adapter includes a magnetically actuated reed switch and a second connector. The communication cable comprises a first end including a third connector that is compatible with the first connector. The communication cable also comprises a second end including a magnet and a fourth connector that is compatible with the first connector. The magnet actuates the reed switch when the fourth connector is connected to the second connector.

In another embodiment, the present invention is a retrofittable, low profile connector or adapter that easily and permanently mounts to a variety of interface configurations including wall panels or receptacles and bed interface stations or units. This is accomplished by providing a housing having a mounting structure, such as ears or flanges, with holes spaced for standard and custom mounting to existing wall receptacles, including those with yokes, to bed interface units, or to electrical boxes.

The connector or adapter of the present invention converts the connection at the wall to robust male and female connectors, such as the 36-pin Centronics type. This type of connector does not use male pins that are easily damaged when connected and disconnected repeatedly. For backward compatibility, a 37-pin female can also be provided on the adapter.

In this embodiment, the communication cable has the standard 37-pin connection at the bed and a low profile mating connector at the adapter. The low profile of the adapter and cable plug provides adequate clearance from the bed frame and mechanisms and minimizes interference with equipment or devices commonly used near or in the bed. The design of the 36-pin plug on the communication cable is

such that it can withstand having a hospital bed rolled over it. In other embodiments of the present invention, the communications cable will have a right angle cord exit Centronics connector and an adapter with a 36-pin Centronics connector.

The present invention, in the embodiment of connecting a hospital bed to a head wall, offers at least the following features and concepts: a low-profile adapter designed to be attached to a variety of wall interface station configurations; an alternate connection to a 37-pin communications cable interface; a rugged plug design for a communications cable; and a controlled attachment and release mechanism for a pin connection.

While certain embodiments of the present invention are disclosed, other embodiments will become apparent to those skilled in the art from the following detailed description. As will be apparent, the invention is capable of modifications in various aspects, without departing from the spirit and scope of the present invention. Accordingly, the drawings and detailed description are to be regarded as illustrative, not restrictive.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1***a* is a prior art communications cable utilizing a 37-pin D-subminiature connector on both ends.

FIG. **1***b* is an end elevation view of the connection portion of the 37 pin plug that connects to a wall as shown in FIG. **1***a*

FIG. **2** is a front isometric view of an adapter of the present invention.

FIG. **3** is a rear isometric view of an adapter of the present invention.

FIG. **4** is an exploded isometric view of the communications cable-wall interface connection system of one embodiment of the present invention.

FIG. **5** is an isometric view of the assembled communications cable-wall interface connection system in the embodiment shown in FIG. **4**.

FIG. **6** is a perspective view of the communications cable connector secured to the adapter in an alternative embodiment of the invention.

FIG. **7** is a front elevation view of the communications cable connector of FIG. **6**.

FIG. **8** is a front elevation view of the adapter of FIG. **6**.

FIG. **9***a* is a top view of one embodiment of a communications cable of the present invention.

FIG. **9***b* is an end elevation view of the connection portion of the 36-pin plug shown in FIG. **9***a*.

FIG. **9***c* is an end elevation view of the connection portion of the 37-pin plug shown in FIG. **9***a*.

FIG. **10** is a wiring diagram of the communications cable in one embodiment of the present invention.

FIG. **11** is a wiring diagram of the adapter in one embodiment of the present invention.

FIG. **12** is a cross-section elevation of the communications cable connector along section line AA of FIG. **7**.

FIG. **13** is a cross-section elevation of the adapter along section line BB of FIG. **8**.

FIG. **14** is a wiring diagram of the adapter in one embodiment of the invention, wherein the adapter has a magnetically activated reed switch.

DETAILED DESCRIPTION

FIGS. **2** and **3** show a front and rear side, respectively, of one embodiment of the adapter **10** of the present invention. In this embodiment, the adapter **10** comprises a housing **12** having a rear face **14**, a front face **16** and an outer perimeter face **18**. The rear face **14** contains a wall interface connector **20** and the front face **16** contains a primary cable connector **22** and a secondary cable connector **24**.

As shown in FIGS. **2** and **3**, a mounting piece **26** is located on the outer perimeter face **18** of the adapter **10**. In some embodiments, there will be both upper and lower mounting pieces **26**. In other embodiments, there will only be upper or lower mounting pieces **26**. In yet other embodiments, the mounting pieces **26** will be located at other locations along the outer perimeter face **18** of the adapter **10**. In some embodiments, the mounting pieces **26** may be designed with multiple mounting holes **34** so the adapter **10** can be compatible with a variety of interface units having differently spaced mounting areas. A controlled attachment and release mechanism, such as attachment clamps **42**, can also be utilized in order to assist in securing attachment of a cable to the connectors on the front face **16**.

In one embodiment, the wall interface connector **20** is a 37-pin D-subminiature male plug, which is designed to be compatible with a connector in a wall unit, the primary cable connector **22** is a 36 pin Centronics female connector, and the secondary cable connector **24** is the same design as the connector located on the wall interface unit. Because the secondary cable connector **24** is the same design as the connector located on the wall interface unit, cables utilizing connectors that are designed to mate with the original connector on the interface unit may be connected without removing the adapter **10**. This feature allows the adapter **10** to be permanently attached to the interface unit **28**. In other embodiments, there is no secondary cable connector **24**. In yet other embodiments, the secondary cable connector **24** is designed to be compatible with connectors other than those that are compatible with any of the other connectors. In other embodiments, the primary cable connector **22** is any Centronics connector.

In other embodiments, the adapter **10** is designed to be interposed between, and facilitate connection between, a connector of a communications cable and a connector of a wall interface in a hospital bed environment where the cable and wall connectors are incompatible. In another embodiment, the present invention is a method for connecting a communications cable to a wall interface unit in a hospital bed environment where a connector on the cable and a connector on the wall are incompatible.

FIG. **4** is an exploded isometric view of one embodiment of the present invention. The interface unit **28** of the present invention may comprise any interface unit designed for connection with a cable, including those designed for connection to a communication cable. Typically, such interface units **28** usually comprise an interface cable connector **30** and mounting holes **32**. The wall interface connector **20** located on the rear **14** of the adapter **10** is designed to be compatible with the interface cable connector **30** located on the front of the interface **28**. In one embodiment, the wall interface connector **20** is a 37-pin D-subminiature male plug and the interface cable connector **30** is a 37-pin D-subminiature female plug. Other types of connectors are possible.

As shown in FIG. **4**, the mounting holes **32** are designed for mounting the interface unit **28** to an interface wall station, panel or plate **33** located in or on the medical facility wall. In one embodiment, the mounting pieces **26** on the adapter **10** are designed with mounting holes **34** that will align with the mounting holes **32** on the interface unit **28** so

the adapter **10** can be permanently or semi-permanently connected to the interface unit **28** with a screw **36** or other suitable fastening device. In some embodiments, the mounting pieces **26** may be designed with multiple mounting holes **34** so the adapter **10** can be compatible with a variety of interface units **28** having differently spaced mounting holes **32**.

As illustrated in FIG. **4**, in one embodiment, the communications cable **38** has a cable end connector **40** on its end. The cable end connector **40** is designed to be compatible with the primary cable connector **22** located on the front face **16** of the adapter **10**. In one embodiment, the primary cable connector **22** is a 36-pin Centronics female connector and the cable end connector **40** is a 36-pin Centronics male connector. In other embodiments, as long as the primary cable connector **22** and cable end connector **40** are compatible, the connector sexes may be reversed or the connectors may be a type of connector other than a Centronics 36-pin connector.

In one embodiment, the secondary cable connector **24**, which is located on the front face **16** of the adapter **10**, is the same design as the interface cable connector **30**, which is located on the interface unit **28**. This allows for the optional connection of communication cables **38** utilizing connectors that are designed to mate with the original interface cable connector **30** on the interface unit **28** without needing to remove the adapter **10**. Thus, the adapter **10** may be permanently attached to the interface unit **28**. In other embodiments, there is no secondary cable connector **24**. In yet other embodiments, the secondary cable connector **24** is designed to be compatible with connectors other than those that are compatible with any of the other connectors.

FIG. **5** shows the components of FIG. **4** in an assembled state according to one embodiment of the invention. The adapter **10** is operably connected to the interface unit **28** with the wall interface connector **20** and the interface cable connector **30** in mating connection. The fasteners **36** connect the adapter **10** to the interface unit **28** through the mounting holes **34** on the mounting pieces **26** and the mounting holes **32** on the interface unit **28**. The communications cable **38** is connected to the adapter **10** with the primary cable connector **22** and the cable end connector **40** in mating connection.

As shown in FIGS. **4** and **5**, to secure the connection between the primary cable connector **22** and cable end connector **40**, a controlled attachment and release mechanism is provided. In one embodiment, the controlled attachment and release mechanism comprises attachment clamps **42** and brackets **44**. In one embodiment, the attachment clamps **42** are located on the front face **16** and the brackets **44** are located on the cable end connector **40**. In other embodiments, their locations are reversed. These devices are designed to mate in way that secures the connection between the primary cable connector **22** and cable end connector **40** while allowing a disconnect to occur at a specified force.

In one embodiment, as illustrated in FIG. **6**, the controlled attachment and release mechanism does not utilize attachment clamps **42** and brackets **44** to secure connection between the cable end connector **40** and primary cable connector **22**. Instead, the connection between the primary cable connector **22** and cable end connector **40** is secured via a friction fit arrangement between the cable end connector **40** and the adapter **10**. The friction fit secures the connection between the primary cable connector **22** and cable end connector **40** while allowing a disconnect to occur at a specified force.

As shown in FIGS. **6** and **7**, the cable end connector **40** has an outer rim **60** that forms a perimeter about the cable end connector **40**. The outer rim **60** has a toe **65**, a heal **70**, a first side **75**, and a second side **80**. The toe **65** is arcuately shaped and has a bump **85** that protrudes from the surface of the toe **65**. In another embodiment, the heel **70** will have the bump **85**. In another embodiment, one or both sides will have bumps **85**. In yet other embodiments, other bump location combinations will be utilized. In other embodiments, the toe **65** will have other shapes.

As indicated in FIGS. **6** and **8**, a toe stop **90** and a secondary cable connector **24** are located on the front face **16** of the adapter **10**. The toe stop **90** is arcuately shaped for receiving the toe **65**. In other embodiments, the toe stop **90** will be other shapes and these shapes will correspond to the shape of the toe **65** to be received by the toe stop **90**. As shown in FIG. **6**, the toe **65** tightly abuts against the toe stop **90**, resulting in a friction fit between the primary cable connector **22** and the cable end connector **40**. In other embodiments, the friction fit will result from the first side **75** of the outer rim **60** abutting against the side of the secondary cable connector **24**. In other embodiments, the friction fit will result from the heel **70** abutting against a heel stop. In yet other embodiments, the friction fit will result from various combinations of these means. In other embodiments, the friction fit results from structural interaction between the primary cable connector **22** and the cable end connector **40**.

FIG. **9***a* shows an exemplary communications cable **38** used in one embodiment of the present invention. The cable **38** has a cable end connector **40** and a bed interface connector **48**. The cable end connector **40** of the cable **38** connects to the primary cable connector **22** on the front face **16** of the adapter **10**. The bed interface connector **48** connects with an interface, for example a hospital bed interface.

The cable end connector **40**, as described above, is a rugged connector suitable for the application and, in one embodiment, is a 36-pin Centronics male connector. FIG. **9***b*, which is an end elevation of the cable end connector **40**, illustrates the pins **46** of the cable end connector **40**. Connectors of the 36-pin Centronics type are advantageous over 37-pin D-subminiature connectors in this environment. This is because the Centronics connectors have a more durable design and can withstand more physical abuse than the D-subminiature connectors.

In one embodiment, the bed interface connector **48** of the communications cable **38** is designed to be compatible with a hospital bed interface unit. Hospital bed interface units are typically designed to be attached to the communications cable via a D-subminiature 37-pin female connector with thumbscrews **50**. FIG. **9***c*, which is an end elevation of the bed interface connector **48**, shows the pins **52** of the bed interface connector **48**. In other embodiments, the two ends of the cable **38** can have different types of connectors, as long as they are compatible with their intended connection points.

Typically, the connectors at the connection between the cable **38** and the hospital bed interface unit are not damaged as often as the connectors at the connection between the cable **38** and the wall interface. This is because the connectors at the connection between the cable **38** and the wall interface are more often detached and reattached. For example, the connectors at the connection between the cable **38** and the hospital bed interface unit often remain connected and are not detached when the bed is moved. This is because the communications cable **38** often travels with the bed as the bed is moved to another location within the medical facility.

FIG. **10** shows a wiring diagram of an exemplary communications cable **38** of one embodiment of the present invention. In the embodiment shown in FIG. **10**, the cable **38** is that shown in FIG. **9***a*. The cable end connector **40** of the cable **38** has a 36-pin connector, and the bed interface connector **48** of the cable **38** has a 37-pin connection member. FIG. **10** illustrates how the two different connectors **40**, **48** may be wired so that information can flow through the cable **38** without compatibility issues.

FIG. **11** shows a wiring diagram of the inside of the adapter **10** of one embodiment of the present invention. In the embodiment of FIG. **11**, the wall interface connector **20**, as described above in FIG. **4**, is a 37-pin D-subminiature male connector, the primary cable connector **22** is a 36-pin Centronics female connector, and the secondary cable connector **24** is a 37-pin D-subminiature female connector. FIG. **11** illustrates how, in this embodiment, the primary cable connector **22** and the secondary cable connector **24** are wired to the wall interface connector **20** so information may travel through the device without interruption.

In one embodiment of the invention, as shown in FIGS. **12** and **13**, the cable end connector **40** and the adapter **10** are adapted to provide an magnetically operated interlock for the nurse call system. As illustrated in FIG. **12**, which is a cross-section elevation of the cable end connector **40** along section line AA of FIG. **7**, a magnet **100** is embedded in the cable end connector **40** near its toe **65**. In one embodiment, the magnet **100** is fully sintered neodymium and is nickel chrome plated.

As shown in FIG. **13**, which is a cross-section elevation of the adapter **10** along section line BB of FIG. **8**, a magnetically activated reed switch **105** is embedded in the adapter **10** near its toe stop **90** so as to be in close proximity to the magnet **100** when the cable end connector **40** and the primary cable connector **22** are connected. In other embodiments, the magnet **100** will be embedded in other locations in the connector **40** and the reed switch **105** will be embedded in a corresponding location within the adapter **10** to remain in close proximity to the magnet **100** when the cable end connector **40** and the primary cable connector **22** are connected.

FIG. **14** shows a wiring diagram of the inside of the adapter **10** illustrated in FIG. **13**. The magnetically activated reed switch **105** serves as an interlock to the nurse call system. When the cable end connector **40** is not in close proximity to the reed switch **105** (i.e., the cable end connector **40** is not adequately connected to the primary cable connector **22**), an electrical open is sensed by the nurse call system and a "cord out" alarm is initiated. The magnet **100** and reed switch **105** combination makes it much more difficult for someone to defeat this important nurse call function. Also, the magnet **100** and reed switch **105** combination deters a person from installing cable that is inferior, untested, or unapproved for the application.

Although the present invention has been described with reference to certain embodiments, persons skilled in the art will recognize that changes may be made in form and detail without departing from the spirit and scope of the invention.

We claim:

1. An adapter for facilitating the connection of a communications cable connector to a connector of a health care facility wall interface unit, the adapter comprising:

a housing having a first face, a second face and an outside perimeter face, wherein the housing is adapted to be attached to the health care facility wall interface unit and the first face abuts the interface unit when attached;

a first connector, wherein said first connector is located on the first face and adapted to connect to the connector of the health care facility wall interface unit;

a second connector, wherein said second connector is located on the second face and adapted to connect to the cable connector; and

a third connector, wherein the third connector is located on the second face and is in electrical communication with the first connector, wherein the first and third connectors both have the same number of electrically conductive pins,

wherein the first connector is in electrical communication with the second connector and the first and second connectors have a dissimilar number of electrically conductive pins.

2. The adapter of claim **1**, wherein the first connector is a 37-pin D-subminiature male plug.

3. The adapter of claim **1**, wherein the second connector is a 36-pin female Centronic-type connector.

4. The adapter of claim **1**, wherein the third connector is a 37-pin D-subminiature female plug.

5. The adapter of claim **1**, further comprising a mounting piece located on the outside perimeter face.

6. The adapter of claim **1**, further comprising a magnetically actuated reed switch.

7. The adapter of claim **1**, further comprising a controlled attachment and release mechanism for securing the communication cable to the adapter.

8. The adapter of claim **7**, wherein the controlled attachment and release mechanism comprises a friction fit arrangement.

9. The adapter of claim **7**, wherein the controlled attachment and release mechanism comprises a bracket and a clamp.

10. The adapter of claim **1**, further comprising a communication cable including a connector on a first end and a connector on a second end, wherein the connector on the first end is said cable connector and the connector on the second end is adapted to connect to a hospital bed connector.

11. The adapter of claim **10**, wherein the cable connector is a 36-pin male Centronics-type connector and the connector on the second end is a 37-pin connector.

12. The adapter of claim **10**, wherein the second connector and the cable connector both have the same number of electrically conductive pins.

13. The adapter of claim **11**, wherein the cable connector and the connector on the second end have a dissimilar number of electrically conductive pins.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

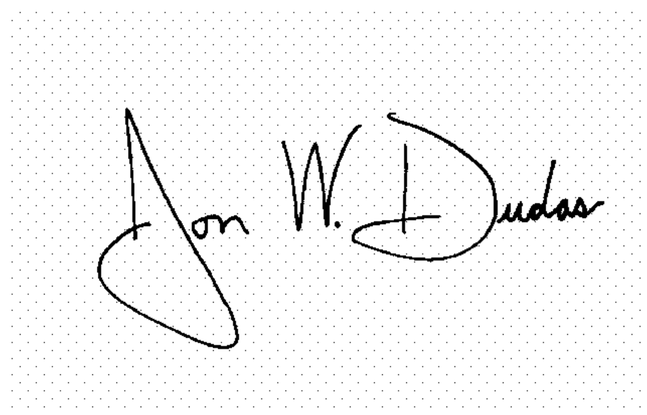
PATENT NO. : 6,945,821 B2
DATED : September 20, 2005
INVENTOR(S) : Mark Peter Stoner et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 8,
Line 28, delete "Centronic-type" and insert -- Centronics-type --.
Line 55, delete "**11**" and insert -- **12** --.

Signed and Sealed this

Fourteenth Day of February, 2006



JON W. DUDAS
Director of the United States Patent and Trademark Office